

CLAIMS

1. An electric assisted turbocharger comprising:
 - a center housing comprising a turbocharger shaft rotatably disposed therein that is rotatably carried on a bearing assembly;
 - a turbine housing attached to the center housing and comprising a turbine disposed therein, the turbine being attached to one axial end of the turbocharger shaft;
 - a compressor housing positioned at an end of the center housing opposite from the turbocharger housing, the compressor being attached to the other axial end of the turbocharger shaft;
 - a motor housing interposed between the compressor housing and the center housing;
 - and
 - an electric motor positioned inside of the motor housing, the electric motor having a stator and a rotor, the rotor being coupled to the shaft, wherein the stator has a left-hand winding projecting outwardly from an axial end of the motor towards the compressor, and a right-hand winding projecting outwardly from an opposite axial end of the motor towards the center housing, wherein the left-hand winding extends radially a greater distance along the motor than that of the right-hand winding, and wherein the motor comprises a radial gap between the rotor and the right-hand winding; and
 - wherein the center housing includes an axial end portion that projects inwardly into the motor housing into an area defined by the radial gap.
2. The electric assisted turbocharger as recited in claim 1 wherein the rotor additionally comprises:
 - a groove defined in an outer surface of the rotor adjacent an axial end of the rotor that faces toward the turbine;
 - a piston ring disposed within the groove in the rotor for forming a leak-tight seal with a surface of said axial end portion of the center housing;
 - a pair of end plates coupled to the rotor adjacent rotor axial ends;
 - a magnet positioned between the two end plates and coupled to the rotor shaft; and
 - a magnet retainer surrounding the magnet.
3. The electric assisted turbocharger as recited in claim 1, wherein the electric motor comprises an induction motor.

4. The electric assisted turbocharger as recited in claim 1, wherein the electric motor comprises a switched-reluctance motor.

5. The electric assisted turbocharger as recited in claim 2, wherein the rotor additionally comprises:

a second groove defined in an outer surface of the rotor adjacent an opposite axial end of the rotor that faces toward the compressor;

a second piston ring disposed within the second groove in the rotor for forming a leak-tight seal with a surface of a fixed structure of the turbocharger.

7. The electric assisted turbocharger as recited in claim 1 wherein the rotor additionally comprises an integral thrust spacer in axial contact with the bearing assembly.

8. An electric assisted turbocharger comprising:

a center housing comprising a turbocharger shaft rotatably disposed therein;

a turbine housing attached to the center housing and comprising a turbine disposed therein, the turbine being attached to one axial end of the turbocharger shaft;

a compressor housing positioned at an end of the center housing opposite from the turbocharger housing, the compressor being attached to the other axial end of the turbocharger shaft;

a motor housing interposed between the compressor housing and the center housing;
and

an electric motor positioned inside of the motor housing, the electric motor having a stator and a rotor, the rotor being coupled to the shaft and comprising:

two grooves disposed into an outer surface of the rotor adjacent opposite rotor axial ends;

a piston ring disposed within each respective groove for forming a leak-tight seal with a respective motor housing surface and a center housing surface;

a pair of end plates coupled to the rotor adjacent rotor axial ends;

a magnet positioned between the two end plates and coupled to the rotor shaft;

and

a magnet retainer surrounding the magnet.

9. An electric assisted turbocharger comprising:

a center housing comprising a turbocharger shaft rotatably disposed therein, wherein the shaft is rotatably carried by a bearing assembly disposed within the center housing;

a turbine housing attached to the center housing and comprising a turbine disposed therein, the turbine being attached to one axial end of the turbocharger shaft;

a compressor housing positioned at an end of the center housing opposite from the turbocharger housing, the compressor being attached to the other axial end of the turbocharger shaft;

a motor housing interposed between the compressor housing and the center housing;
and

an electric motor positioned inside of the motor housing, the electric motor having a stator and a rotor, the rotor being coupled to the shaft and comprising:

a groove defined in an outer surface of the rotor adjacent an axial end of the rotor that faces toward the turbine;

a piston ring disposed within the groove in the rotor for forming a leak-tight seal with a surface of said axial end portion of the center housing;

a pair of end plates coupled to the rotor adjacent rotor axial ends;

a magnet positioned between the two end plates and coupled to the rotor shaft;

and

a magnet retainer surrounding the magnet; and

wherein the rotor assembly comprises an integral thrust spacer that is in axial contact with the bearing assembly.